nals were ordered at display stations, the verifications of which it was impracticable to determine.

In twenty-eight instances winds were reported which would have justified the display of cautionary signals, but for which no signals were ordered, and in one instance a wind which would have justified the display of on-shore signals, but for which no signals were ordered.

COLD-WAVE SIGNALS.

Total number of cold-wave signals ordered, the verifications of which were determined, two hundred and fifty-eight; verified, one hundred and eighty-nine, or 73.26 per cent. Fifty-four signals were ordered, the verifications of which it was impracticable to determine.

In addition to the above, in one thousand and thirty-five instances, the signals ordered from this office were repeated by the observers at the regular stations to towns in their vicinity. The verifications of these it was impracticable to determine.

RAILWAY WEATHER SIGNALS.

P. H. Mell, jr., director of the "Alabama Weather Service," in the report for February, 1887, states:

The verification of predictions for the whole area was 89 per cent. for temperature, and 80 per cent. for weather.

The following corporations comprise this system: South and North; Montgomery and Mobile; Mobile and Girard; Georgia Pacific; East Tennessee, Virginia and Georgia system in Alabama; Memphis and Charleston; Columbus and Western; Atlanta and West Point of Georgia; Northeastern of Georgia; Western and Atlantic; East Tennessee, Virginia and Georgia system in Georgia; Montgomery and Eufaula; Pensacola and Selma; Pensacola and Atlantic; the cities of Milledgeville, Georgia, and Talladega, Alabama.

The following is from the "Bulletin of the New England Meteorological Society" for February, 1887:

Verification of weather signals at New Haven was 85.7 per cent. for temperature, 92.9 for weather.

STATE WEATHER SERVICES.

The following is an extract from the February, 1887, report of the "Alabama Weather Service," P. H. Mell, jr., of the Agricultural and Mechanical College, Auburn, director:

The mild weather during a portion of February, and the high temperature until the last few days, exerted an invigorating influence upon vegetation; and in many portions of the state blossoms and leaves burst forth very early in the month. The temperature was 7°.6 above the normal.

Rains were frequent during the month but thunder-storms were of rare occurrence, even though the temperature remained so high. On the 11th, 18th, and 26th strong winds occurred, but of such moderate force as to commit no damage. Severe storms and tornadoes were warded off from the state because of the high pressure that prevailed during the entire month, with the exception of the 20th, when a low wave passed over the state, producing an unusually heavy precipitation at all stations. The rainfall of the month was 0.61 of an inch below the normal.

The temperature for the winter months just ended indicates a slight range above the normal, 1°.8; while the precipitation was 2.23 inches below the normal.

Summary.

Mean temperature, 56°.8; highest temperature, 81°, at Eufaula, on the 18th; lowest temperature, 20°, at Gadsden, on the 28th; range of temperature, 61°; greatest monthly range of temperature, 54°, at Florence and Gadsden; least monthly range of temperature, 39°, at Selma and Troy; mean daily range, 11°.3; greatest daily range of temperature, 37°, at Eufaula, on the 11th; least daily range of temperature, 0°, on the 22d, at Mount Willing.

Mean depth of rainfall, 4.18 inches; mean daily rainfall, 0.146 inch; greatest depth of monthly rainfall, 9.40 inches, at Trinity; least depth of monthly rainfall, 2.35 inches at Bermuda; greatest daily local rainfall, 2.95 inches, at Eufaula, on the 20th.

Average number of days on which rain fell, 8; average number of cloudy days, 16; average number of fair days, 6; average number of clear days, 6; warmest days, 18th and 23d; coldest day, 28th; prevailing direction of wind, southeast.

The following is an extract from the February, 1887, report of the "Arkansas Weather Service," Mr. George R. Brown, of Little Rock, director:

Hail was reported from Mount Ida the 2d, and from Fayetteville the 14th and 25th.

A general sleet prevailed throughout a greater part of the state on the 4th, being reported from Fayetteville, Springdale, Osceola, and Little Rock, also from Memphis and Cairo.

The largest amounts of rainfall in one day were on the 13th, at Conway, 1.7; Fayetteville and Osceola, 1.5; and on the 14th, at Russellville, 3.55; Mount Ida, 2.0.

Thunder-storms occurred at Little Rock the 14th and 17th; Mount Ida, 17th and 23d; Conway, 23d, and at Fayetteville, 25th. During the storm of the 17th at Little Rock a house was struck by lightning, which was also struck about the same time last year, although in the interval it had been fitted up with lightning-rods. The damage this time was not as great as last year.

High winds prevailed generally on the 12th, 25th, and 26th, and several points report more or less damage done by the wind on those days.

The highest temperatures occurred at Fayettville University, 85°, on the 28th; at Eureka Springs, 81°, on the 16th; at Mount Ida and Conway, 74°, on the 28th.

The lowest temperatures at Springdale, 13°, and Eureka Springs, 14°, on the 3d. The month was generally warmer than usual.

There were three cold-wave signals ordered during the month. The most severe wave was one which entered the state at the northwestern part on the evening of the 3d, and during the night and next day prevailed over the entire state. It was most noticeable in the central portion, the temperature at midnight, the 3d, being above 60° and next morning 23°.

The following is an extract from the February, 1887, "Monthly Review of the Illinois Weather Service," Col. Charles F. Mills, of Springfield, director:

The month was noted for its mildness, excessive cloudiness, and precipitation in the form of rain. The mean temperature of the state averaged 2° above the normal for the month. The highest temperatures were recorded from the 7th to the 10th, and the lowest on the 4th. The lowest monthly mean temperature reported was 20°.7, from Galena, and the highest, 43°.4, from Golconda, a range of 22°.7 from the extreme northwest to southeast sections of the state—within 0°.2 of the January range of mean temperature covering the same extent of territory.

The precipitation was heavy and evenly distributed, averaging 1.4 inches above the normal for the month. The snowfall was barely appreciable, except in the extreme northern counties, where it averaged nearly 10 inches. With but three exceptions, all stations reported the monthly precipitation in excess of the February normal. The exceptions were Springfield, 0.18; Mattoon, 0.78; and McLeansborough, 0.05 below the normal. The most marked departures above the normal are as follows: Riley, 3.03; Davenport, 3.12; Peoria, 3.28; Keokuk, 3.28, and Makanda, 4.27. The average snowfall in the state for the month was 2.9 inches; for the northern counties, 6.3 inches; central counties, 0.9 of an inch, and southern counties, 0.6 of an inch. The greatest total snowfall was 16.8 inches at Lake Forest; the least, inappreciable, throughout the central and southern counties.

West to northwest gales were reported on the evening of the 26th and morning of the 27th, caused by a severe storm moving easterly over the Lakes.

The sunshine did not exceed 33 per cent. for the month.

The cold-wave predictions of the 2d–4th, 8–9th, 10–12th, 23d–25th, and 26–27th were fully justified; that of the 14–15th was not justified, the temperature falling but 10°. Althought the temperature was sufficiently low for frost on nearly every day of the month, yet its formation was retarded by excessive cloudiness, foggy mornings, and great percentage of humidity.

Thunder-storms, with hail and sleet, were frequent.

Summary of the winter of 1886–'87.

The mean temperature of the past winter for the state was 24°.5; the highest temperature reported was 75°; the lowest, —32°. The average precipitation was 8.29 inches. Prevailing direction of the wind, northwest. There were 25 clear, 25 fair, 40 cloudy, and 26 days on which appreciable precipitation fell.

The following is an extract from the February, 1887, report of the "Indiana Weather Service," Prof. H. A. Huston, of Purdue University, Lafayette, director:

The mean pressure for the month was considerably above the normal, while the range was the greatest recorded in sixteen years. The barometer was very high at the beginning of the month and continued rising until the 4th, when the highest point was reached—30.901 at Lafayette. From the 4th it continued falling until the 10th, when there was a rapid rise until the 18th, after which the downward motion began again and continued until the 18th, when the lowest point was reached—29.130 being recorded at Fort Wayne. There was another very rapid rise until the normal was reached on the 19th; then a very decided fall on the 26th, followed by as decided a rise on the 27th. The month was thus characterized by great and abrupt fluctuations in the pressure, the extent of which has seldom been equalled.

The temperature was from four to six degrees above the normal, with about the average range. Four cold waves passed over the state, on the 1st, 4th, 12th, and 27th, corresponding with the "highs" of the barometer. The highest temperature was on the 10th, immediately followed by the lowest on the 12th and 13th, making a range of 72° in two days.

The precipitation was everywhere above the normal from four to six inches, according to locality, and was unusually heavy on the 2d and 3d all over the state, and again on the 26th. It was nearly all in the form of rain, only little snow being reported, and that only from the northern part of the state.

The following is an extract from the February, 1887, report of the "Kansas Weather Service," Mr. J. T. Lovewell, Topeka, director:

The mean temperature has been below the average. Cold waves were frequent and were invariably announced by the Chief Signal Officer from twelve to twenty-four hours in advance.

Precipitation in measurable quantities occurred in western Kansas on the 8th, 17th to 21st, and on the 25th, and in Logan county, where the greatest fall in this part of the state occurred, almost continuously during the latter half of the month. In the middle counties the greatest rainfall of the month occurred from the 17th to 21st. In the eastern counties precipitation was quite frequent, and, except in the southwestern portion where it was light, exceeded the average of past years.

This has been a windy month, reports showing the total movement to be above the average. The most notable blow occurred on the 16th, 17th, 18th, and was accompanied by snow, with very low pressure.

Thunder-storms occurred in the eastern counties on the 8th, 9th, and 10th.

The following is an extract from the report of the Michigan State Board of Agriculture for February, 1887. The state weather service is in charge of N. B. Conger, Sergeant, Signal Corps, U. S. Army:

The service up to this date has progressed very rapidly, and weather and temperature signals are now displayed in one hundred and two cities and towns in the state, and applications are being filed for an increase in this valuable aid in placing the daily indications furnished by the Signal Service within the reach of hundreds of thousands of the citizens of Michigan.

The appropriation granted by the legislature has made it possible to extend these indications into the state by telephone and telegraph to many towns that otherwise could not be supplied.

* * * * * * *

This month has been remarkable for the excess of snow and rainfall, it being about 1.25 inches above the normal. The latter part of the month, especially, had heavy storms which caused heavy rains and thunder-storms in the southern portion of the state, while the northern half received a heavy snowfall which, with the heavy wind, drifted badly along the railroads, causing some damage and detention.

There were two thunder-storms during this month, which is unusual, one on the west shore on the 7th, and one on the 23d which was general throughout the state. Damage was reported from Saginaw City, the Methodist Episcopal church spire being struck and damaged about $100.

Two prominent storms passed the state during the month, one, on the 17th and 18th, showed a very low area, the barometer at the central office reading 29.179 (corrected and reduced) at 7 a. m. of the 18th, and began rising in the evening and rose rapidly during the 19th.

The rainfall was heavy during the early morning of the 18th and changed to snow in the afternoon. The total precipitation during the storm was 1.13 inches. The maximum velocity of wind was thirty-six miles southwest on the 18th.

The storm of the 26th and 27th was remarkable for the changes from snow to rain during the night and to snow again in the afternoon of the 26th. A high wind accompanied this storm (southwest thirty-four miles on the 26th, and northwest thirty-four miles on the 27th at this office), and considerable damage was done to telegraph and telephone wires in the state. At Grand Rapids the damage was estimated at about $3,000.

Five cold waves passed over the state during the month. Cold-wave signals were displayed from twenty-four to forty hours in advance of these waves, and the signals were all justified by a fall of from 19° to 30°. The most prominent wave passed over on the 24th and 25th; the fall was 28°. The signal was ordered at 6.30 p. m. of the 28d.

The following is an extract from the February, 1887, report of the "Minnesota Weather Service," Prof. Wm. W. Payne, Carleton College, Northfield, director:

The month was notable for its very low temperature. The high winds which characterized a number of days caused several severe snow-drifts, impeding railroad travel to a considerable extent. There were five periods of general precipitation throughout the state, these occurring from the 1st to 2d (inclusive), 7th to 11th, 17th to 19th, 22d and 23d, and 25th and 26th. The greatest amount was precipitated during the storm occurring from the 17th to 19th.

Temperature.—The mean for the month was 6°.7, which is 6°.4 below that of the corresponding month of the year previous. The periods of greatest cold prevailed principally on the 1st, 3d to 6th, 8th to 12th, 20th to 24th, 26th and 27th. The mean daily temperature was considerably below zero over the entire state on the 1st, 3d, and 4th. The minimum for the month was 41°.3 below zero, and occurred at Park Rapids on the 12th, while on the 4th it was 38°.0 below at Saint Vincent. At Saint Paul the mean was 7°.9 below the average of the corresponding month for seventeen years, and the lowest since February, 1875, when it was 2°.7 below zero. At Saint Vincent it was 6°.8 below the average; Moorhead, 6°.5 below; Duluth, 5°.5 below; La Crosse, 5°.3 below. The maximum temperature for the month was recorded at La Crosse on the 8th, and was 44°.5. The highest temperatures occurred mainly in the latter portion of the month, during the prevalence of a "chinook" wind or warm wave that followed the "blizzard" of the 26th, and which caused the snow to disappear rapidly.

Precipitation.—This was mainly in the form of snow. At Saint Vincent it was 0.40 (in inches) above the average, while elsewhere throughout the state it was generally below the normal. In the southern portion the precipitation averaged an inch less than for the corresponding month of last year, while in the northern portion it was about the same. The greatest amounts that fell were 2.06 at Rochester, and 2.02 at Mankato and Northfield; stations reporting the least amount were Morris, 0.20; Grand Forks, 0.40; Moorhead, 0.58; Park Rapids, 0.65, and Albert Lea, 0.77. In the extreme northwestern portion of the state, 7.5 inches more of snow remained on the ground at the close of the month than at the end of the corresponding month of 1886, while in a narrow belt running across the state from Moorhead to Duluth there was two inches less; immediately to the south of this belt was another, extending as far south as Saint Paul, in which about nine inches more remained on the ground. In the southern portion of the state the snow was irregularly distributed and in some localities averaged about the same as last year.

The following is from the February, 1887, report of the "Mississippi Weather Service," Prof. R. B. Fulton, of the University of Mississippi, Oxford, director:

Mean temperature, 58°; highest, 81°, at Artonish, on 9th; lowest, 28°, at Batesville, on the 4th; monthly range, 53°.

Average rainfall, 4.98 inches; greatest monthly rainfall, 8.37; least monthly rainfall, 3.50 inches; average number of days on which rain fell, 10.

Frost occurred on one day only during the month, the 28th, and was reported from Batesville, Palo Alto, Loch Leven, Biloxi, Waynesborough and Starkville.

Thunder-storms occurred at Lamar on the 2d, 18th, 26th; Batesville, 3d, 24th; Vicksburg, 19th, 20th, 26th; Palo Alto, 1st 23d, 26th; Artonish, 14th, 22d; Biloxi, 15th, 19th, 20th, 21st; Oxford, 1st, 14th, 23d.

Sleet fell at Lamar and Batesville on the 4th.

The following is from the February, 1887, report of the "Missouri Weather Service," Prof. Francis E. Nipher, of Washington University, Saint Louis, director:

The observations of Dr. Engelmann from 1837 to 1882 resulted in showing that when December was abnormally cold there was a high degree of probability that January and February would also be cold, although he also noted exceptions to this rule. In the winter just ended the cold December was followed by a cold January, but February has had an average temperature of 38°.7, which is a little over three degrees above the normal temperature. The average for the whole winter was, however, 31°.4, or about two degrees below the normal winter temperature. The lowest temperature of the month was 8°.5, on the 4th, and the highest 72°, on the 10th. The mean temperatures of the decades were 38°.5 for the first, 38° for the second, and 39°.7 for the third. The temperature fell to, or below, 32° on twelve days, and on four days it did not rise above 32°.

The rainfall at the central station was 3.78 inches, which is 1.28 inches above the normal. Heavy thunder was observed as early as the 1st of the month. The 5th was remarkable for the unusual darkness prevailing in the morning until about noon of that day. At 12 m. it seemed as dark as night. The phenomenon was local.

The highest temperatures were generally observed on the 10th, and the lowest on the 4th of the month.

The rainfall was greatest in the extreme north and south and along the Mississippi River, where it was over four inches, while in the central and western parts the fall was between two and three inches.

The following is from the February, 1887, report of the "Nebraska Weather Service," Prof. Goodwin D. Swezey, Doane College, Crete, director:

The month of February has been in no way a marked month, except that the temperature has been somewhat below the normal.

Precipitation.—The average snowfall has been about eight inches, which is two more than the normal for February. Measured as precipitation or melted snow it has been less than half an inch over all of the state, except in the southeastern sections and portions farther north along the Missouri and west along the Platte. Two small areas of the state, the extreme southeast corner and a large area along the Platte, have from an inch to an inch and a half.

Temperature.—No severe cold waves occurred; most of the cold-wave tracks for the United States lying almost due east from Montana to Maine. The mean temperature of the month has been 19°; the mean noon temperature, 25°.8; the highest reported was 63°.8, at Crete; the lowest, —24°.3, at Hay Springs

Wind.—Rather severe winds have been felt, the highest velocity being sixty miles an hour at Lincoln.

Crop report.—Reports from various localities indicate that the season everywhere is well advanced and spring grain is being sown.

The following extracts are from the February, 1887, report of the "New England Meteorological Society," Prof. Wm. H. Niles, of the Institute of Technology, Boston, Massachusetts, president:

Reports for the month were received from one hundred and fifty-one observers.

The weather for the month was variable, being controlled by the passage of nine cyclonic storms. The precipitation in southern New England was generally snow, turning to rain; the heaviest rain was during the thunder-storm of the 18th; the heaviest snow fell on the 26th, and remained on the ground over the end of the month. The total precipitation was decidedly in excess of the normal.

The periods of general cold were also those of very high pressure, on the 5th and 14th; the warmer days were on the 8th, 11th, 16th, 18th or 19th, and 24th,

when the pressure was falling, with southerly winds. The mean temperature of the month was below the normal in north, and above in the south.

There was light snow and rain on the first three days of the month, during the rise and fall of pressure that preceded the passage of the first cyclonic storm down the Saint Lawrence Valley on the 3d; the temperature rose to a maximum of 25° to 40° a little after midnight of the 3d and 4th, and then fell continuously as the storm moved away with high westerly winds on the 4th, reaching a calm minimum on the morning of the 5th (12° to —18°) at a time of very high pressure, the highest on record at several stations. Lunar halos were generally seen on the evenings of the 1st and 4th. On the 8th the third cyclonic storm passed down the Saint Lawrence, with general snow and rain and rising temperature, again reaching a maximum with southerly winds about midnight of the 8–9th, followed by clearing weather, westerly winds, and falling temperature through the 9th to a moderate minimum in the early morning of the 10th. The fourth cyclonic storm passed centrally over New England; it gave solar halos about noon of the 10th, snow and rain on the 11th; the temperature being moderate and almost constant over the cloudy night; the rain ended with a sudden brief rise of temperature in the evening of the 11th, followed quickly by high northwest wind and rapid cooling through the night. This was succeeded by three days of fine cold weather, during the passage of a large anti-cyclone; the highest pressure came on the morning of the 14th, giving the general minimum temperature for the month (5° to 15° in the south, —20° to —30° in the north).

The approach and northern passage of a poorly developed cyclonic storm, the fifth of the month, caused a warm wave (40° to 50°) on the 15th and the 16th, with moderate snow or rain on the 15th. There was a slight fall of temperature with the passage of an area of high pressure on the night of the 17th, succeeded by a rise again as a well developed cyclone passed down the Saint Lawrence on the 18th and 19th; a thunder-storm, with heavy wind and rain, occurred in the evening of the 18th in southern New England. There were then slight weather changes until the 24th; the seventh barometric depression, on the 22d, being very faintly marked. The storm of the 24th came rapidly from Texas, and moved down the Saint Lawrence, giving general snow the night before, rain in the morning, and clearing at noon.

The 26th was suddenly clouded and gave heavy snow in the afternoon and night during the passage of the ninth and last storm of the month; the temperature rose through the night with southerly winds and fell from the morning or noon of the 27th as the clouds cleared away, with westerly wind and snow squalls, thus closing the month with a windy cold wave on the 28th, reaching a minimum temperature on the morning of March 1st.

Thunder-storm of the 18th.—The fifth cyclonic storm of the month was attended by local thunder-storms south of its path, during its passage from Iowa over the Great Lakes to the Saint Lawrence. While the cyclonic centre crossed Lake Huron, a thunder-storm traversed southern New England, entering from New York about 19h. and passing eastern Massachusetts between 21h. and midnight; it had little force north of Massachusetts, but was violent towards the southern coast, where the morning had brought a chilling snow storm, changing to sleet and rain in the afternoon, with rapidly falling pressure, and to heavy rain, with thunder and lightning and strong, warm southeasterly winds in the evening, at the time of lowest pressure. Several buildings were struck by lightning.

The following is an extract from the February, 1887, report of the "New Jersey Weather Service," Prof. George H. Cook, of the Agricultural College, New Brunswick, director:

The thunder-storm of the 18th was the most remarkable phenomenon of the month. It was a summer thunder-storm in all its characteristics. The temperature was high, the rain came down in torrents, the lightning was frequent and the clearing up as sudden as anything that ever happened in the middle of July. Every station in the state, except Atlantic City, experienced the same storm, and quite a number of the observers gave the time it began. In general its progress was from southwest to northeast. At Union the flashes were vivid, averaging three a minute; seventy terrific flashes were counted, and there was a greater number of fainter flashes.

The mean temperature as given at New York City, Philadelphia, Moorestown, New Brunswick, Princeton, Somerville, South Orange, Readington, and Salem, when compared with normals determined for those stations, shows an average excess in temperature of 3°.3 for the month. The daily range of temperature was quite even. Mr. Spader, at New Brunswick, reports that on nineteen days the range was less than 10°.

Rainfall.—Twenty stations report rain or snow to have fallen on an average of 12.6 days of the 28. The precipitation was excessive in amount, but quite evenly distributed throughout the several counties. The mean rainfall, as compared with normals determined at eight stations, shows an average excess of 2.40 inches. Sixteen stations noting amount of cloudiness show an average of thirteen days when the amount of cloudiness averaged eight or more on a scale of zero to ten. Union, Red Bank, and Clayton report the most sunshine.

The following is from the February, 1887, report of the "South Carolina Weather Service," Hon. A. P. Butler, Commissioner of Agriculture for South Carolina, director:

The first part of the month was characterized by rather high temperature, but from the 12th until the close of the month there was a slight decrease in the daily means, accompanied by cold rains at frequent intervals. The mean temperature of the month was, however, slightly above the average in the middle and lower counties of the state, and about normal in the upper division. For the state it was 12°.5 above the mean for January. The minimum temperature of the month occurred at all stations on the 28th, and ranged from 24° in the upper counties to 34° on the coast. The highest temperatures occurred during the first part of the month, except in Anderson, Abbeville, and Spartanburg counties, where the maxima were reported on the 18th.

The greatest amount of rain fell in the upper counties during the latter part of the month. In that section of the state it was probably slightly in excess of the average for February, but in the absence of records for comparison this cannot be clearly determined. In the middle and lower counties the rainfall for the month was below the average. The mean depth of rainfall for the state was 0.61 inch greater than that of the preceding month, January.

The cold waves were not as severe nor as frequent, and did not extend as far southward, as those of the preceding month.

Summary.

Mean temperature, 52°.6; highest temperature, 80°, at Charleston, on the 9th; lowest temperature, 24°, at Yorkville, on the 28th; range of temperature, 56°; greatest daily range of temperature, 40°, at Cheraw, on the 1st; least daily range of temperature, 3°, at Columbia, on the 23d, and at Yorkville, 8°, on the 21st.

Mean depth of rainfall, 3.41 inches; greatest monthly rainfall, 5.40 inches, at Spartanburg; least monthly rainfall, 1.51 inches, at Marion; greatest daily rainfall, 1.55 inches, at Anderson, on the 14–15th. Rainfall exceeding one inch in twenty-four hours occurred as follows: Due West, 14th; Abbeville, 15th and 20th; Spartanburg, 18th; Anderson, 19–20th; Yorkville, 20th and 26th; Pacolet, 20th; Anderson, 24th. Least daily rainfall (inappreciable), at several stations, on the 1st, 3d, 7th, and 18th.

Frosts.—Frosts occurred generally on the 28th, and in the upper and middle counties on the 13th, 14th, 17th, 25th, and 27th. From the reports it is believed that fruit and vegetables suffered no material injury from frost during the month.

Sleet was reported on the 12th and 14th.

The following is from the February, 1887, report of the "North Carolina Weather Service," Dr. Charles W. Dabney, jr., of Raleigh, director:

Eastern district.

Temperature.—February has been a comparatively warm month; the temperature for the eastern district, 50°.4, is 5° higher than the normal, 45°.3. The greatest daily range, 39°, was noted at Cape Henry, Virginia, on the 12th. The least daily range, 3°, was noted at Smithville on the 19th. The mean daily range was 17°.4. The highest temperature, 77°, was noted at New-Berne, on the 11th; abnormally high temperatures also prevailed at all points on the 1st, 2d, 7th to 11th, inclusive, 15th to 20th, inclusive, 24th and 26th. The lowest, 20°, was noted at Lynchburg, Virginia, on the 14th; abnormally low temperatures on the 5th, 18th, 14th, and 28th, at other points in this district were recorded. The absolute range, 57°, was 10° less than the general range for the state.

Precipitation.—Although the rainfall in this district has been reasonably fair, and generally well distributed, yet the official records at five Signal Service stations show a deficiency of 1.17 inches as compared with the general average computed for a series of thirteen consecutive years.

Central district.

Temperature.—The monthly mean temperature, for all points, stands at 48°.4, while the normal for nine years at Charlotte is 45°.6—an excess of 3° for the current month. The greatest daily range, 46°, was noted at Maxton, on the 14th, but this record is questionable, the second greatest, 37°, at Goldsborough, on the 17th, looks more reasonable. The least daily range, 5°, on various dates, was noted at Charlotte, Raleigh, Kinston, Davidson College, Salem, Mount Pleasant, and High Point. The mean daily range was 20°.1. The highest temperature, 79°, on the 1st, was noted at Chapel Hill, and at various other points abnormally high temperatures were noted on the 1st, 2d, 7th to 11th, inclusive; 16th to 19th, inclusive; 24th and 26th; the lowest, 12°, on the 14th, was at Reidsville, and on the 5th, 6th, 12th to 14th, inclusive; 20th to 23d, inclusive; 27th and 28th, abnormally low temperatures prevailed; the absolute range was 67°.

Precipitation.—The monthly average precipitation was 4.02 inches, this, compared with the general monthly average, 4.45 inches, determined by the official records at Charlotte, for a series of nine consecutive years, shows a small deficiency, 0.43 inch, for the month of February, 1887. As the February record at Charlotte is above the general average for all other points in the central district, these figures, although not satisfactory, can be accepted as a fair comparison. Four days, the 8th, 13th, 25th, and 28th, were remarkable for an entire absence of rain.

Western district.

Temperature.—Mean temperature, 49°.2; highest, 74°, on the 10th, at Chattanooga, Tennessee; lowest, 12°, on the 27th, at Chattanooga; absolute range, 62°; greatest daily range, 39°, on the 1st, at Asheville; least, 3°, on the 21st, at Marion. Mean daily range, 19°.2.

Precipitation.—Whether the average rainfall on the western slope of the Smoky Range Mountains is a fair standard by which we can estimate the probable rainfall for the eastern slope, is an unanswered question; future developments, can, however, prove this. Official statistics on record at Chattanooga and at Knoxville, Tennessee, covering a period of nine consecutive years, show an average rainfall of 5.11 inches for the month of February—5.35 inches at Chattanooga and 4.87 inches at Knoxville.

These averages, compared with the actual amount of rainfall collected at

these points, show an excess of 1.81 inches at Chattanooga, and 1.80 inches at Knoxville.

Summary.

Mean temperature, 49°.2; highest temperature, 79°, on the 1st, at Chapel Hill; lowest temperature, 12°, on the 27th, at Asheville; greatest daily range, 39°, on the 1st, at Knoxville, Tennessee; least daily range, 8°, on the 19th, at Smithville; mean daily range of temperature, 18°.9.

Average monthly rainfall, 3.85 inches.

Prevailing directions of wind, northeast and southwest.

Average number of clear days, 4; average number of fair days, 11; average number of cloudy days, 13.

Record of sunshine at Experiment Farm, two miles west of Raleigh, North Carolina.

Date.	Number of hours of possible sunshine.	Number of hours recorded by instrument	Degree of intensity.	Time of day during sunshine.	Remarks.
1887.	*h.* *m.*	*h.* *m.*			
Feb. 1	10 7	5 30	.....	9.30 a. m. to 12.15 p. m., 1 p. m. to 3.45 p. m.	
2	10 9	0 0	.....	.....	Foggy all day.
3	10 10	3 0	Faint.....	1.15 p. m. to 2 p. m., 3 p. m. to 5 p. m.	
4	10 12	0 0	....	.....	Cloudy.
5	10 15	0 0	.....	.....	Rainy.
6	10 17	0 0	.....	.....	Do.
7	10 20	4 45	Interrupted..	11.30 a. m. to 4.15 p. m.....	
8	10 22	4 0	Bright	12.30 p. m. to 4 40 p. m.....	
9	10 25	2 45	Faint	9.30 a. m. to 12.30 p. m....	
10	10 27	1 0	Faint haze...	1.15 p. m. to 2.15 p. m.....	
11	10 29	6 30	Faint	9.45 a. m. to 4.15 p. m.....	
12	10 31	6 0	.....do.....	9.45 a. m. to 3.45 p. m.....	
13	10 34	7 0	Bright	9.15 a. m. to 4.15 p. m.....	
14	10 36	0 0	.....	.....	Cloudy.
15	10 39	0 0	....	.....	Do.
16	10 42	6 15	Bright	11 a. m. to 5.15 p. m.....	
17	10 44	7 0	.....do	9 a. m. to 4 p. m.....	
18	10 46	1 30	Faint	Various intervals	
19	10 49	6 30	Bright	9.30 a. m. to 4 p. m.....	
20	10 52	0 0	....	.....	Cloudy.
21	10 55	0 0	.....	.....	Do.
22	10 57	0 0	.....	.....	Do.
23	11 00	0 0	.....	.....	Do.
24	11 3	5 15	Faint	12.30 p. m. to 5.30 p. m.....	
25	11 6	5 15	Bright	9.15 a. m. to 2.30 p. m.....	
26	11 8	0 0	.....	.....	Cloudy.
27	11 10	7 45	Bright	9 a. m. to 4.45 p. m.....	
28	11 12	8 0	.....do.....	9 a. m. to 5 p. m.....	
Average..	10 39	3 9			

The following is an extract from the "Tennessee State Board of Health Bulletin" for February, 1887, prepared under the direction of J. D. Plunkett, M. D., President of the State Board of Health. The weather report is prepared by H. C. Bate, Director of the State Meteorological Service:

The month of February was characterized by an abnormally high temperature with an excessive amount of rainfall and high winds, also for the absence of snowfall.

The mean temperature was 49°.3, more than four degrees above the highest February mean of the past four years, and as much as 15°.5 above the 1885 mean, which was the lowest of the period named. The highest temperature, 76°, recorded on the 2d and 10th, was the greatest maximum in February of the past four years, being 2° above that in 1884—the next highest. The lowest temperature, 25°, recorded on the 18th and 28th, was the highest minimum recorded in February of the past four years, the next highest being 4° below zero in 1885. It was 42° above the February minimum in 1886—a remarkable difference. The general ranges of temperature were small compared with those of the two preceding years. During the month, four cold waves extended over the state, three of which were verifications of the predictions, and one a partial verification. The first was announced on the 3d, temperature 35°, minimum reached 26°.3 on the 4th. This warning was partially verified. The second was announced on the 8th, temperature 67°, minimum 42° on the 9th. The third was announced on the 11th, temperature 57°, minimum 22°.7 on the night of the 12th and morning of the 13th. The fourth was announced on the 26th, temperature 60°, minimum 28° on night of the 27th and morning of the 28th. The last three were fully verified.

The mean depth of rainfall was 8.03 inches, more than two inches greater than the February mean of the past four years, and not quite half an inch less than the mean of February, 1884, which was abnormally great. It was 5.64 inches greater than the mean in 1885, and 4.23 inches greater than that in 1886. Of this amount the eastern division received an average of a little more than seven inches, the middle division about eight and three-fourths inches, and the western division nearly seven and a half inches. The greatest monthly rainfall was 13.08 inches, reported at Riddleton, which also reported the greatest February rainfall in 1884 and 1885. The least rainfall was 5.35 inches, reported at McKenzie. The greatest local daily rainfall was 4.38 inches, reported at Dickson on the 23d. The days of greatest rainfall were the 3d, 14th, 23d, and 26th; the greatest fall being on the 23d, when an average of about an inch an a half of rain fell throughout the state. The rain of the 14th was very nearly as great. The 10th, 27th, and 28th were the only days reported without rain. Most of the rains during the month were general, though many of them were light. The proportion of cloudiness was abnormally great. A marked feature was the entire absence of snowfall. The winds during the latter half of the month were high, and destructive to timber and fencing. Several severe electric storms accompanied the rains. Frosts occurred on about ten days, and about half of them were killing frosts.

Summary.

Mean temperature, 49°.3; highest temperature, 76°, on the 2d, at Hohenwald, and on the 20th, at Riddleton; lowest temperature, 20°, on the 13th at Hohenwald, and on the 28th, at Greeneville, Cookeville, and Manchester; range of temperature, 56°; mean monthly range of temperature, 47°.7; greatest monthly range of temperature, 56°, at Hohenwald; least monthly range of temperature, 41°, at Rogersville; mean daily range of temperature, 14°.2; greatest daily range of temperature, 41°, on the 3d, at Milan and Memphis; least daily range of temperature, 2°, on the 6th, at Waynesborough; mean of maximum temperatures, 72°.3; mean of minimum temperatures, 28°.9.

Average number of clear days, 4.7; average number of fair days, 7.1; average number of cloudy days, 16.2; average number of days on which rain or snow fell, 12.5.

Warmest days, 2d, 10th; coldest days, 13th, 28th.

Prevailing winds, south and southwest.

NOTES AND EXTRACTS.

BAROMETRIC PRESSURE DURING HIGH WINDS.

The following report by Sergeant D. J. Carr, observer at Mount Washington, New Hampshire, has been received by the Chief Signal Officer in reply to a communication directing that special observations of the mercurial and aneroid barometers be made at that station for the purpose of ascertaining, approximately, the effects of high winds and gusts on barometric pressure within a room like that of the station at Mount Washington:

I have the honor to report that the observations have been made as directed and the utmost care taken to secure reliable data. The construction of this building rendered it impossible to obtain direct exposures of the barometers to the windward, and the leeward window used to obtain data is southeast, twenty-four feet distant, and in a different room from where the barometers are situated, as may be seen by consulting the attached diagram. From the data obtained, I would make the following reply to the questions contained in your letter:

1st. "When very violent winds are blowing, does the mercurial barometer fluctuate or pump noticeably; if so, what is the range and what is the duration of the fluctuations, and how are they related to gusts of wind?" Answer: Rapid fluctuations of the barometer are always noticed during the prevalence of high winds, but the extent of these fluctuations are dependent upon the ingress or egress furnished the air, if all windows and doors are closed the fluctuations do not exceed .003 of an inch, but they are practically continuous and are due to the air escaping through the open door of the stove; to obviate this is impracticable, as it is necessary to keep the drafts closed; it is also believed, too, that the swaying or trembling of the building has a slight effect upon the column of mercury in the barometer. The fluctuations of pressure during high winds when either a windward or leeward window is open are very marked, and will be referred to.

2d and 3d. "Do these fluctuations consist principally in a dropping below an average or in a rise above; which occurs first, the drop or the rise? What is the difference in character and extent of these fluctuations under the following different conditions: Doors and windows all shut and the chimney draft and stove closed as much as possible; doors and windows shut and the chimney draft opened wide; chimney closed and a leeward window open; chimney closed and a windward window open?" Answer: the curve of fluctuation depends upon whether the air is admitted to the room by opening a windward window, or an escape to the leeward furnished it. If a windward opening is made an increased pressure is immediately noted, the increase being proportional to the velocity of the wind; if a leeward window is opened a decreased pressure is shown. There is, however, a difference both in the character and extent of the fluctuations under the above conditions. The opening of a windward window and the increase of pressure are synchronous, while if a leeward window is opened an interval of time elapses before a decreased pressure is noted; this interval is very small, probably not more than a second, and is caused, perhaps, by the immediate surcharging with air of the room when a windward opening is made, while when a leeward window is opened the air lacks, as it were, the force to push it out at once. With doors and windows closed and the chimney drafts open there are slight fluctuations, a wind of 100 miles per hour causing a rise or fall in the barometer of not more than .006 of an inch, the fall generally occurring first, although the opposite has been occasionally noticed.

4th. "Besides the changes in fluctuations, possibly due to the opening of windows, is there any difference in the general height of the barometer due to open and closed windows and chimney?" Answer: Yes; the general height of the barometer during high winds, excluding fluctuations, is sensibly affected by the opening of a windward or leeward window; in the former case it is above and in the latter below the normal, the effect being greater under the former conditions, and in both cases the extent is governed by the velocity of the wind, being, in fact, proportional to its velocity.